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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/067,265	02/07/2002	Jun Dong Kim	P67585US0	6688

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EXAMINER	
SARKAR, ASOK K	

ART UNIT	PAPER NUMBER
2829	

DATE MAILED: 02/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/067,265	Applicant(s) KIM ET AL.	
	Examiner Asok K. Sarkar	Art Unit 2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 February 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 12 recites the limitation "step of successively forming the conducting layer and the insulating layer" in claim 1. There is insufficient antecedent basis for this limitation in the claim. The lack of antecedent basis renders the claim indefinite.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1 – 3, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blatchford, US 2002/0187434 in view of Kashihara, US 6,458,284 or Lin, US 6,150,263.

Regarding claim 1, Blatchford teaches a method of photolithographic process prior to transfer of the features into an underlying substrate in which he forms the first mask pattern 120 on the substrate 110 in such a manner that the desired region of the

substrate is exposed with reference to Fig. 3A and isotropic etching the first mask pattern to form the second mask pattern with reference to Fig. 3B and Fig. 2.

Blatchford fails to teach forming a conducting layer and a hard mask on a substrate to form a bit line, isotropic dry etching the first mask pattern, etching the hard mask using the second mask pattern, removing the second mask pattern and etching the conducting layer using the remaining hard mask.

Kashihara teach forming bit lines by forming a conducting layer 2 and a hard mask layer 1a with reference to Fig. 2 in column 6, lines 6 – 27, isotropic dry etching the mask pattern of Fig. 10 to provide the mask pattern of smaller size in column 9, lines 26 – 67, etching the conducting layer 2, using the remaining hard mask with reference to Fig. 11.

Lin teaches a similar method as Kashihara to fabricate small dimension wires for bit lines (see column 3, line 23) with reference to Figs. 1A – 1D.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to apply the photolithographic process taught by Blatchford to the substrates containing the conducting line and the hard mask in order to form the bit lines of smaller dimension since Blatchford, Kashihara and Lin teach the method of forming the bit lines of smaller dimensions to overcome the limitation of the photolithographic process and all processes can be used interchangeably including the dry isotropic etching process.

Regarding claim 2, Blatchford teaches the step of forming the first mask pattern by etching a photoresist film using a photolithography process with reference to Fig. 3A.

Regarding claim 3, Blatchford fails to teach isotropic dry etching the first mask pattern.

Kashihara teaches that isotropic dry isotropic etching can be used to reduce the size of the mask pattern in column 9, lines 56.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Blatchford's isotropic etching process by applying isotropic dry etching since dry etching is more convenient for etching features of small sizes.

Regarding claim 12, Kashihara teaches hard mask layer of oxide and nitride in column 3, line 26.

Regarding claim 13, Lin teaches conducting layer of tungsten silicide in column 2, line 50.

6. Claims 4 – 11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blatchford, US 2002/0187434 in view of Kashihara, US 6,458,284 or Lin, US 6,150,263 as applied to claims 1 - 3 above, and further in view of Wolf and Tauber, "Silicon processing for the VLSI Era, Vol. 1", Chapter 16, p 539, Lattice Press, CA (1986).

Blatchford in view of Kashihara or Lin fails to teach isotropic dry etching process using, microwave power at a selected range, oxygen gas at a selected range of flow rate, CF_4 gas, gas pressure inside the etching chamber and the etching rate.

Wolf and Tauber teaches throughout chapter 16 various ways of dry etching can be applied to different materials including the use of microwave energy, CF_4 gas and

oxygen for etching resist materials (Organic Films in Page 564), various equipments and process control throughout the chapter.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to judiciously adjust and control these parameters during the etching process through routine experimentation and optimization to achieve optimum benefits (see MPEP 2144.05).

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 703 308 2521. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 703 308 1233. The fax phone numbers for the organization where this application or proceeding is assigned are 703 308 7722 for regular communications and 703 308 7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 4918.

KAMAND CUNEO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Asok K. Sarkar
January 22, 2003